

# Alpha Drive Unit Service

## Section 3E - Shift Cable Installation, Drive Unit Installation and Shift Setup

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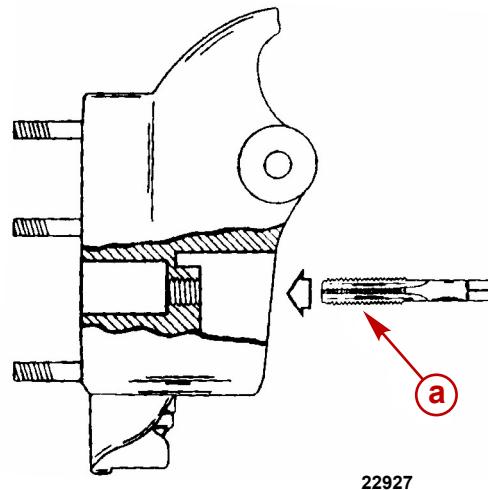
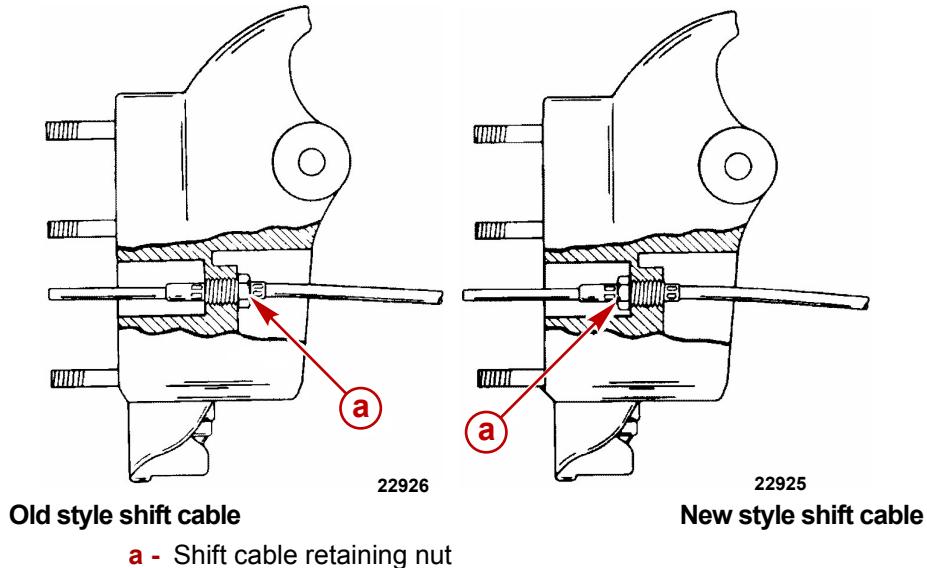
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## MerCruiser I Drive Unit Intermediate Shift Cable Identification

Transom assembly serial number 6376504 and above.

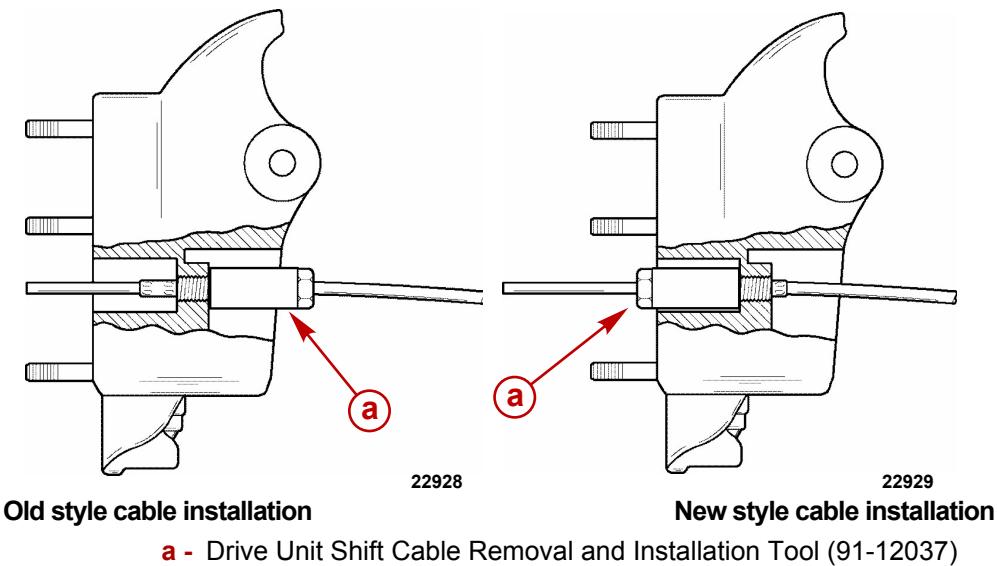
**IMPORTANT:** This newer style cable (which attaches to bell housing from aft end) can be used on models with the old style shift cable (attached on front side of bell housing). To do this, the threaded hole in bell housing must be tapped all-the-way through, using a 1/4-18 NPSF tap. This special Straight Thread Tap may be obtained thru Quicksilver by ordering 91-95639. The following important information must be observed when performing tapping operation.

- Tapping must be done from the front (bellows side) end of bell housing to prevent cross-threading.
- Never use a Tapered Thread Tap, as improper positioning of shift cable may result, or water may leak into bell housing.



### **Threading shift cable hole in bell housing (older models) to accept the new style shift cable**

**a - 1/4"-18 NPSF Tap (91-95639)**



## MerCruiser I/I-R/MR/Alpha One - New Style (Aft) Shift Cable - Conduit and Core Wire Identification

Transom assembly serial number 0C698141 and above.

A new style drive unit shift cable is being used. Following is a list of the major differences from the earlier cable.

**IMPORTANT: The new style shift cable is pre-cut to proper length and should be replaced as an assembly only. Do not mix parts between old and new style.**

1. Larger diameter armor wrapped core wire. (Figures 1 & 2)
2. Larger diameter hole in shift cable anchor. (Figures 3 & 4)
3. Larger diameter hole inside of shift slide. (Figures 5 & 6)
4. Larger diameter shift cable conduit (to accommodate larger diameter core wire). (Figures 7 & 8)

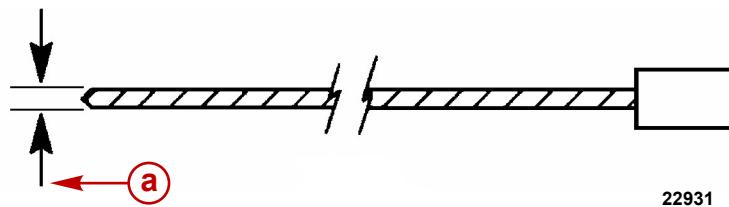


Figure 1. Older core wire

a - 1.9 mm (.075 in.)

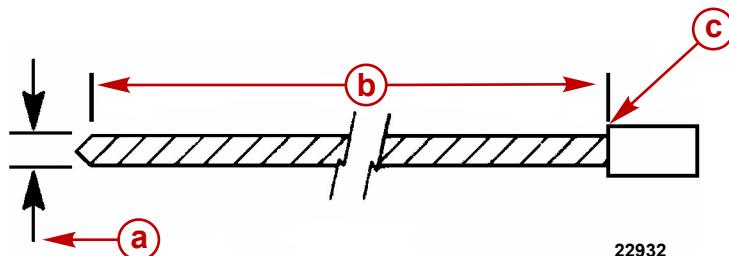
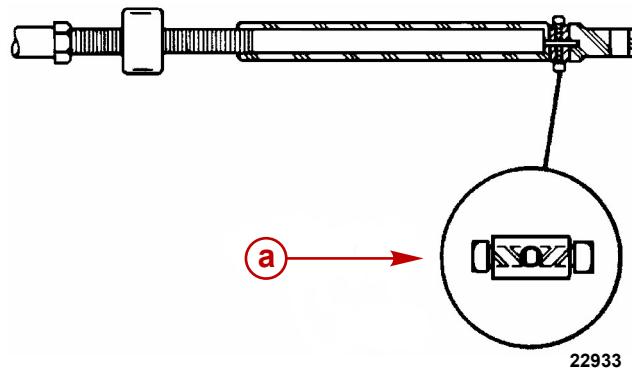


Figure 2. Newer core wire

a - 2.54 mm (.100 in.)

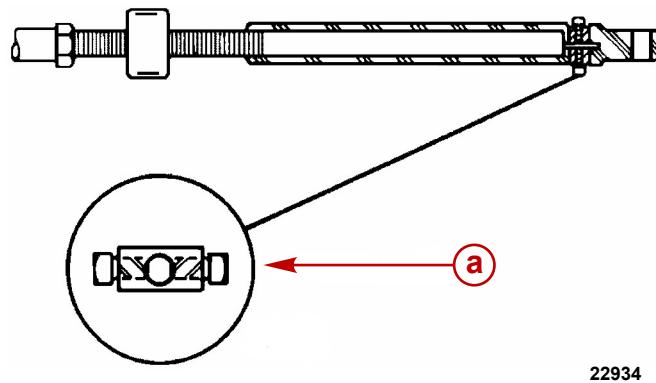
b - New pre-cut core wire dimension 1832 mm (72-1/8 in.)

c - Front edge of anchor



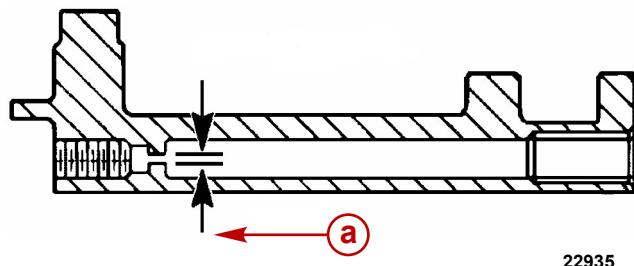
**Figure 3. Older cable anchor**

**a - 1.98 mm (.0781 in.)**



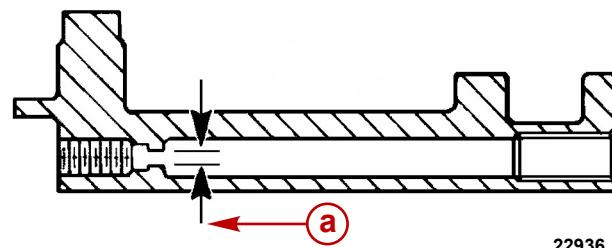
**Figure 4. Newer cable anchor**

**a - 2.62 mm (.103 in.)**



**Figure 5. Older shift slide**

**a - 1.98 mm (.0781 in.)**



**Figure 6. Newer shift slide**

**a - 2.62 mm (.103 in.)**

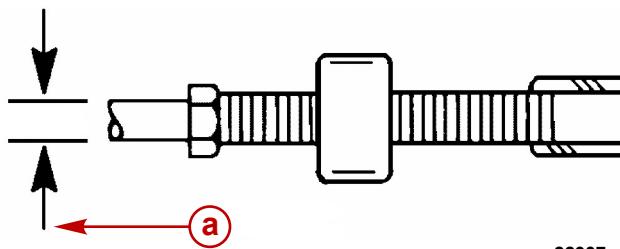


Figure 7. Older shift cable conduit

a - 7.62 mm (.300 in.)

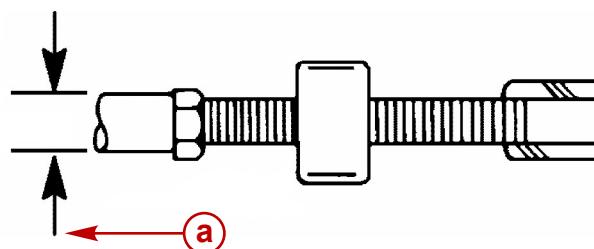
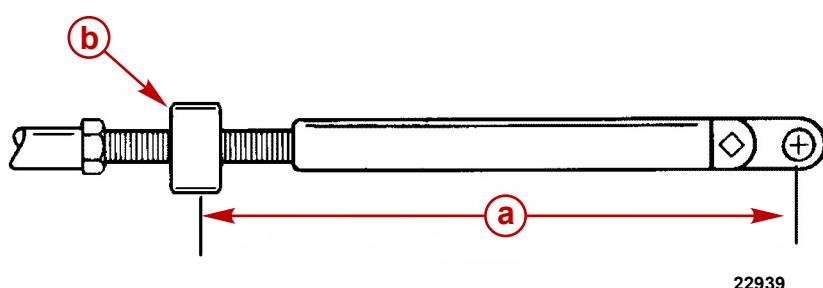
*NOTE: Inner core wire is cut to length at installation*

Figure 8. Newer shift cable conduit

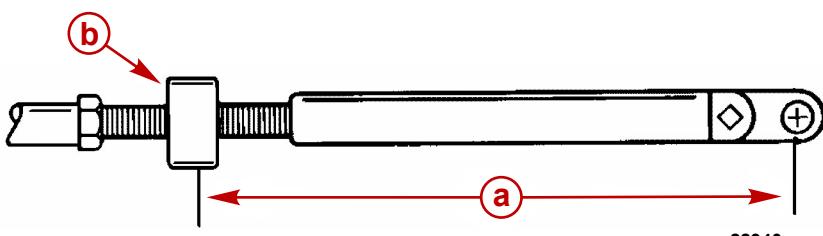
a - 8.25 mm (.325 in.)

*NOTE: Inner core wire is pre-cut by factory**NOTE: The distance from the centerline of the cable end guide to the centerline of the brass barrel was changed in 1974.*

1973 and prior adjustment distance

a - 14.9 cm (5-7/8 in.)

b - Brass barrel



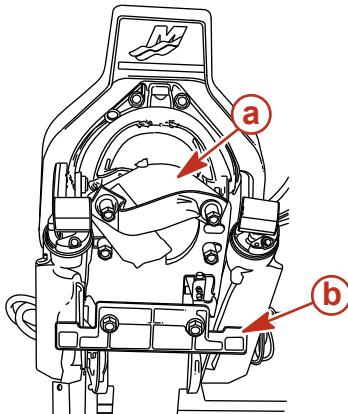
1974 and newer adjustment distance

a - 15.2 cm (6 in.)

b - Brass barrel

## Alpha Sterndrive Installation

1. Remove trim cylinder support and dust cover from bell housing studs. (Retain elastic stop nuts and flat washers.)

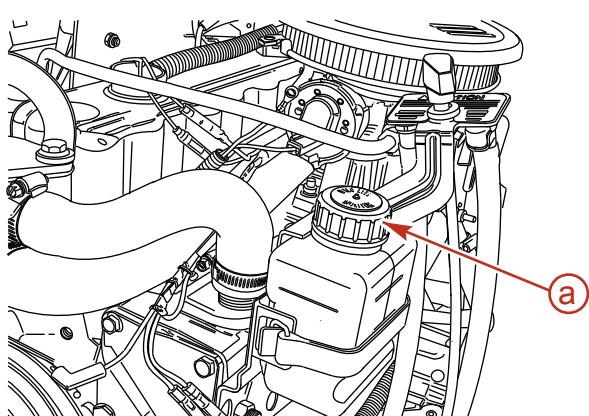


Typical

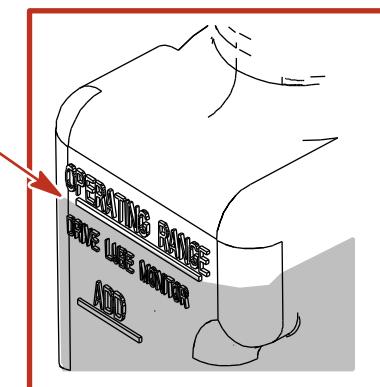
a - Dust cover

b - Trim cylinder support

2. Remove gear lube monitor cap. Fill with lubricant.



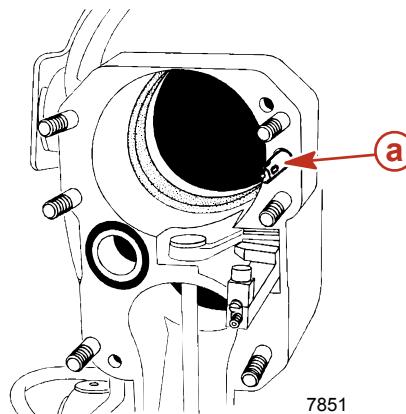
a - - Gear lube monitor cap



b - "OPERATING RANGE" line

Tube Ref No.	Description	Where Used	Part No.
	High Performance Gear Lubricant	Gear lube monitor	92-802854A1

- Push dribble valve stem in until gear lube appears.

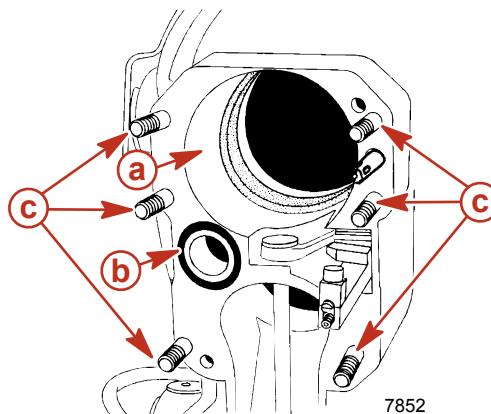


**a - Dribble valve stem**

- Once gear lube appears, release dribble valve stem.
- If the gear lube monitor is below the (full) line: Fill the gear lube monitor to the "OPERATING RANGE" (full) line with specified fluid. Do not overfill.
- Install the gear lube monitor cap. Ensure that the rubber gasket is inside the monitor cap. Do not overtighten the cap.

**IMPORTANT: Rubber gasket must be properly positioned and glued in bell housing bore before installing drive unit or water may leak into boat.**

- Ensure that rubber gasket and water passage O-ring are properly positioned in bell housing. The rubber gasket must be glued in place or water may leak into the U-joint bellows and then into the boat. O-ring must also be glued in place.
- Coat bell housing studs with lubricant.



**a - Rubber gasket**

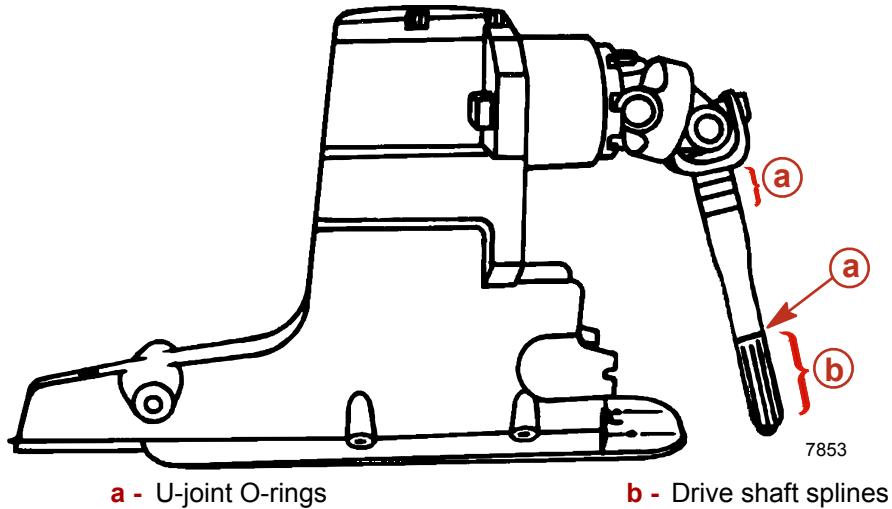
**c - Studs (6)**

**b - Water passage O-ring**

Tube Ref No.	Description	Where Used	Part No.
 95	2-4-C Marine Lubricant with Teflon	Bell housing studs	92-802859A1

## Shift Cable Installation, Drive Unit Installation and Shift Setup

9. Grease sterndrive U-joint O-rings, and drive shaft splines. A grease packet for this procedure is provided with the sterndrive packaging.



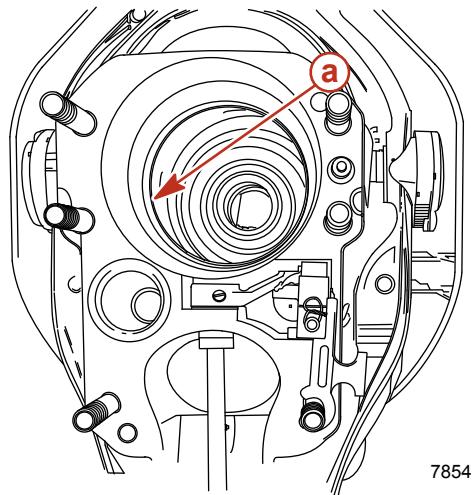
**a** - U-joint O-rings

**b** - Drive shaft splines

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Tube Ref No.	Description	Where Used	Part No.
91	Engine Coupler Spline Grease	U-joint O-rings and Driveshaft splines	92-802869A1

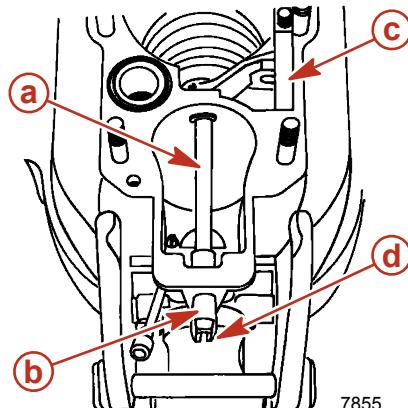
10. Ensure U-joint bellows are clean and free of debris.



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**a** - U-joint bellows

11. Position bell housing shift shaft coupler so that slot in coupler is positioned straight fore and aft. Do this by placing remote control shift lever in: **Forward gear position for RH drive or Reverse gear position for LH drive unit.**

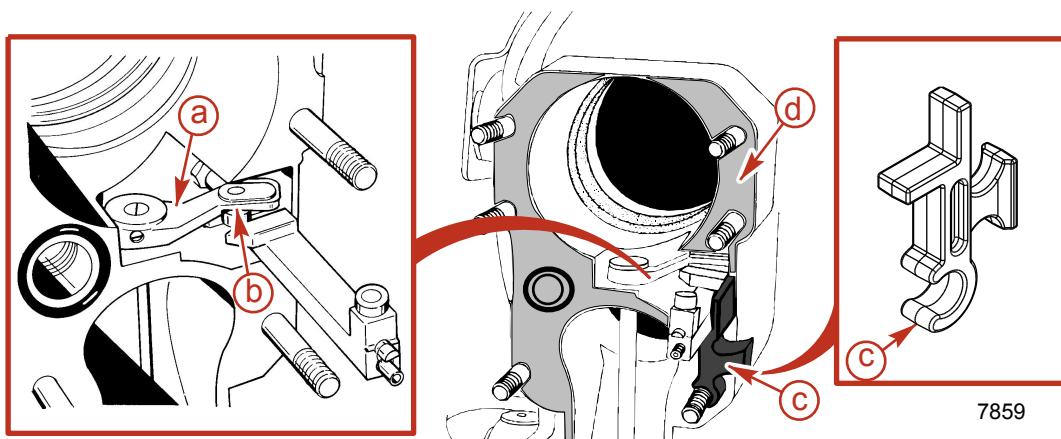


**a** - Shift shaft  
**b** - Shift shaft coupler

**c** - Shift slide  
**d** - Slot

**IMPORTANT: Shift slide assembly is free to rotate on core wire. Ensure that shift slide remains in upright position and is properly engaged with shift shaft lever roller while installing drive unit.**

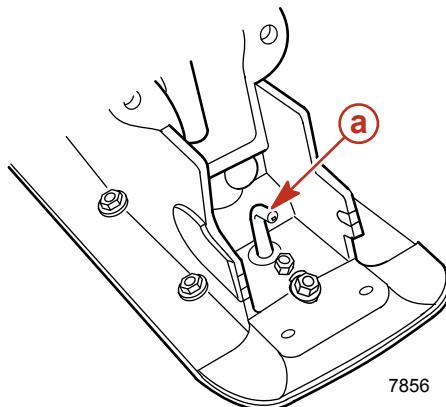
12. Engage shift shaft roller into shift shaft lever.
13. Place gasket on bell housing.
14. Shift Shaft Slide Stabilizer Tool is installed on the stud directly below shift slide.



**a** - Shift shaft lever  
**b** - Roller

**c** - Shift Shaft Slide Stabilizer Tool  
(91-865232)  
**d** - Gasket

15. Position drive unit shift shaft so that it is straight forward by turning shift shaft clockwise while simultaneously turning propeller shaft counterclockwise.



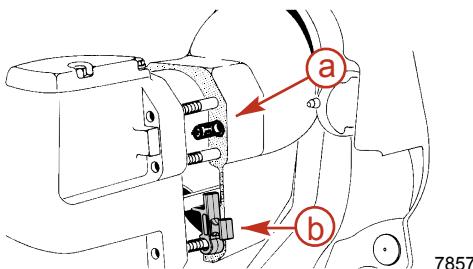
**a** - Drive unit shift shaft

**IMPORTANT:** Install right-hand or left-hand drive unit on the appropriate transom assembly when making dual engine installations. The left-hand rotation drive unit can be identified by the decal on the back side of the upper drive shaft housing, which states: "Alpha One - Counter Rotation"

16. Install sterndrive unit as follows:

- Position trim cylinder straight back (over top of acceleration plate). Be careful not to scratch acceleration plate or trim cylinders.
- Guide U-joint shaft through gimbal bearing and into engine coupler while simultaneously guiding shift slide into driveshaft housing. Ensure that shift slide remains upright and engaged with bell housing shift shaft lever.
- If necessary, rotate propeller shaft counterclockwise slightly to help align U-joint shaft splines with engine coupler splines while sliding sterndrive into bell housing.

**IMPORTANT:** If drive unit will not slide into bell housing, ensure that the shift shaft and couplers are positioned properly. Do not force drive unit into position.

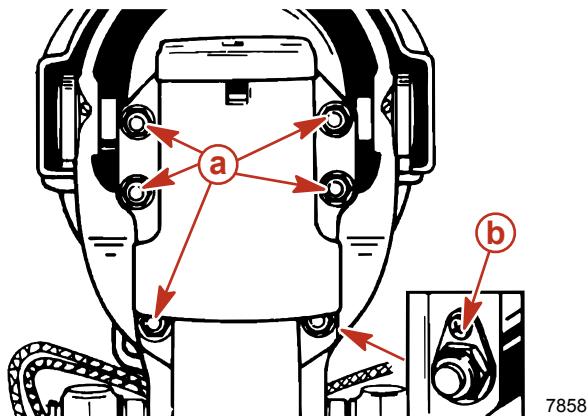


**a** - Gasket

**b** - Shift slide

- Remove Shift Slide Stabilizer Tool.
- Slide sterndrive all the way into bell housing.

f. Secure sterndrive to bell housings using fasteners as shown. Torque the fasteners.



**a** - Locknut and flat washers  
**b** - Locknut and continuity circuit washer (no flat washer at this location)

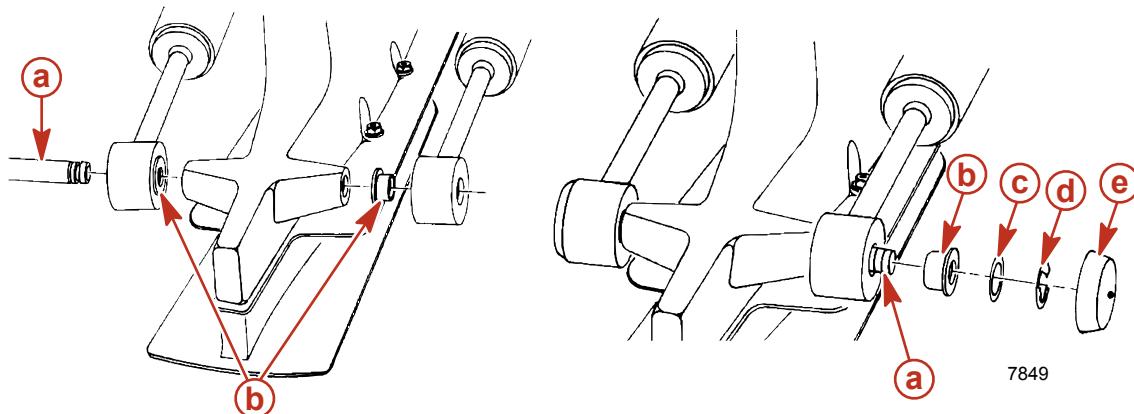
Description	Nm	lb. in.	lb. ft.
Sterndrive unit fasteners	68		50

17. Return remote control shift lever to the neutral position.

## Trim Cylinder Installation

1. Install trim cylinders on aft end of sterndrive unit with hardware as shown.
2. Install the plastic caps by snapping in place.

*NOTE: Upon installation of hardware apply lubricant to all components except plastic caps.*



**a** - Aft anchor pin  
**b** - Bushings  
**c** - Flat washers  
**d** - E-ring clips  
**e** - Plastic caps

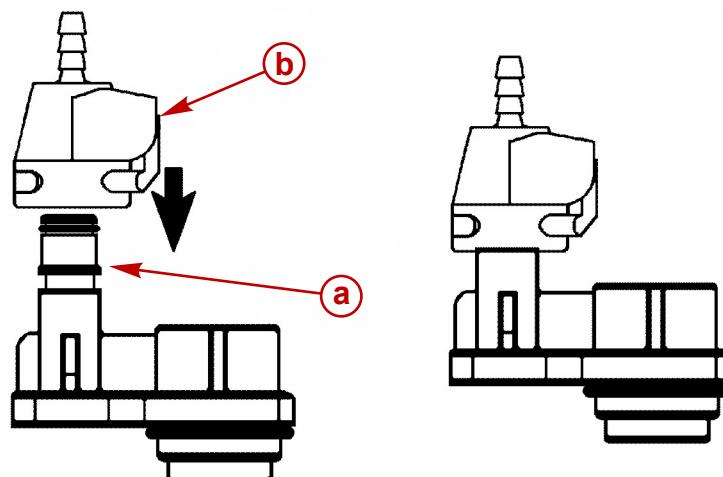
Tube Ref No.	Description	Where Used	Part No.
	2-4-C Marine Lubricant with Teflon	Trim cylinder hardware	92-802859A1

3. Position the sterndrive unit serial number decal.

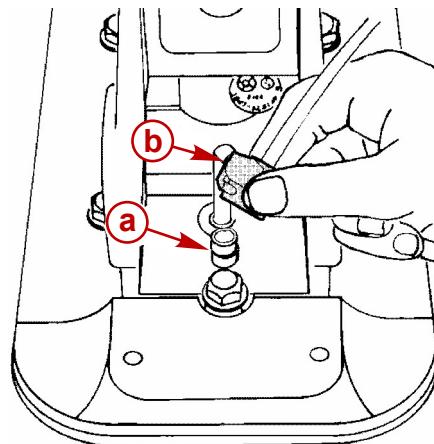
## Attaching Speedometer Water Tube (from Gimbal Housing to Alpha Sterndrive)

1. Raise drive to gain access to area between gimbal housing and sterndrive, immediately above the transom end of the anti-ventilation plate.
2. Align plastic slots on male and female portions and insert.

### 3. Push down to secure.



**a -** Male end of speedometer tube fitting      **b -** Female portion



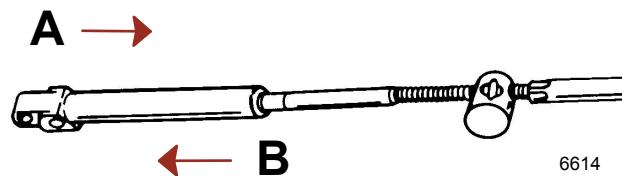
**a -** Tube fitting, male end      **b -** Topside portion, female end

## **Alpha Drive Unit Remote Control and Drive Unit Shift Cables Adjustment, Drive Unit Installed**

**IMPORTANT:** Shift cable adjustment for a right hand (RH) rotation drive unit is different than the procedure for adjusting a left hand (LH) rotation drive unit. Be sure to refer to the appropriate procedure when performing the following steps.

**Right-hand rotation - Install control cable in remote control so that cable end will move in direction "A" when shift handle is placed in the forward position.**

**Left-hand rotation - Install the control cable in remote control so that cable end will move in direction "B" when shift handle is placed in the forward position.**

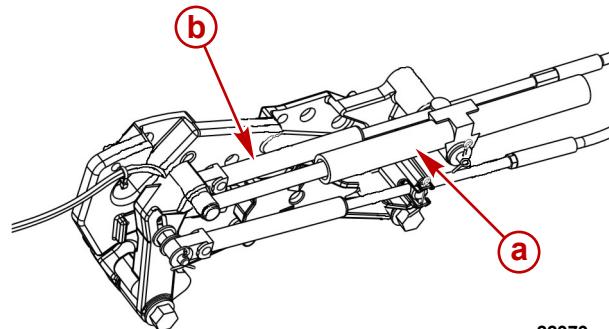


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**IMPORTANT: Drive unit must be installed.**

**IMPORTANT: Do not run engine.**

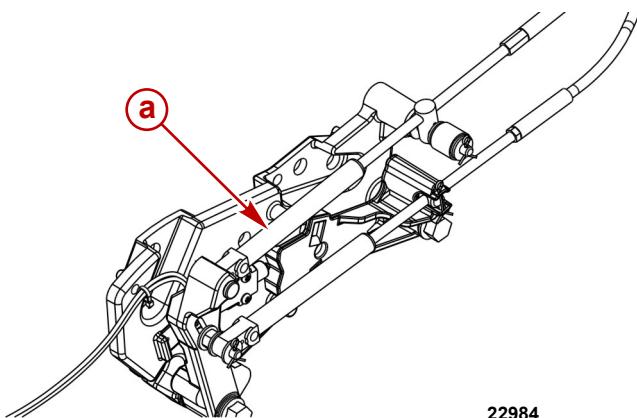
1. Remove remote control shift cable and shift assist assembly (if installed).



With Shift Assist Assembly

a - Shift Assist Assembly

b - Remote control shift cable

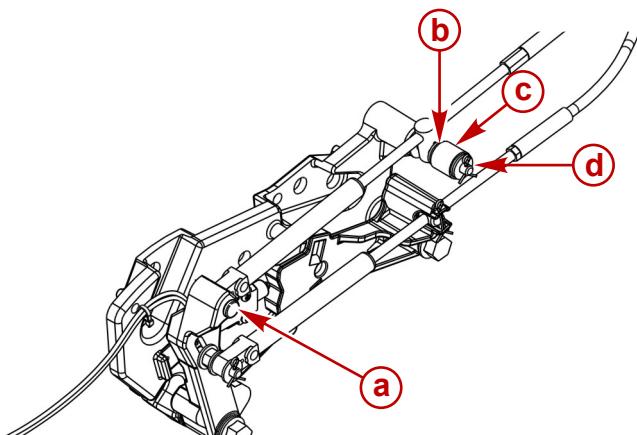


Without Shift Assist Assembly

a - Remote control shift cable

**IMPORTANT:** If boat is being equipped with a remote control that has separate shift and throttle levers, the shift assist assembly that is shipped with the engine should not be used. The use of the shift assist assembly with this type of remote control can cause the shift lever to move out of gear unexpectedly.

A Spacer Kit (23-11284A1) will have to be ordered to connect the remote control shift cable when shift assist assembly is not used.



a - Clevis pin (with cotter pin-not shown)

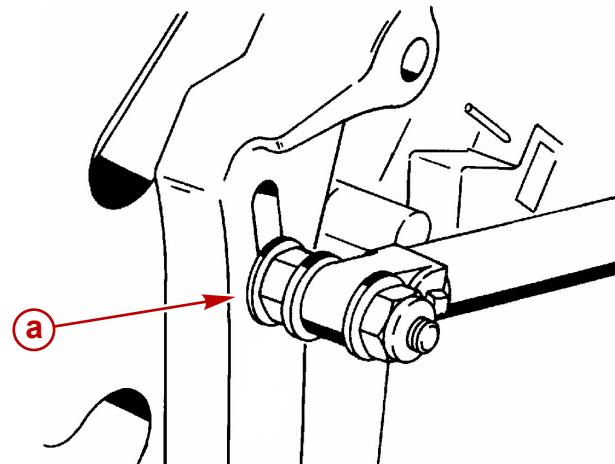
b - Large I.D. washer

c - Spacer

d - Small I.D. washer and cotter pin

## Shift Cable Installation, Drive Unit Installation and Shift Setup

2. Ensure shift lever adjustable stud is at bottom of slot. If necessary, loosen stud and move it to bottom of slot, then retighten stud.

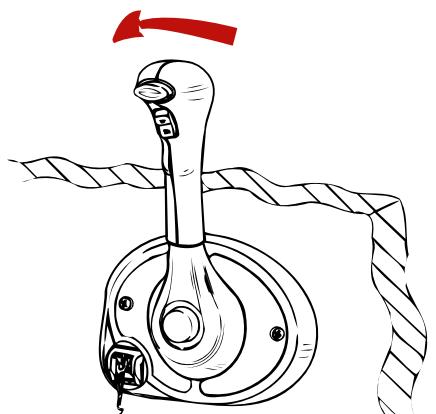


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**a** - Adjustable stud

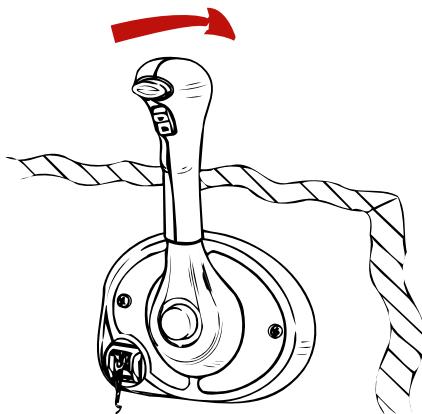
3. Shift remote control as stated in "a" or "b" following:

- Right-hand (RH) rotation drive unit** - forward gear, past detent, into wide-open-throttle position.



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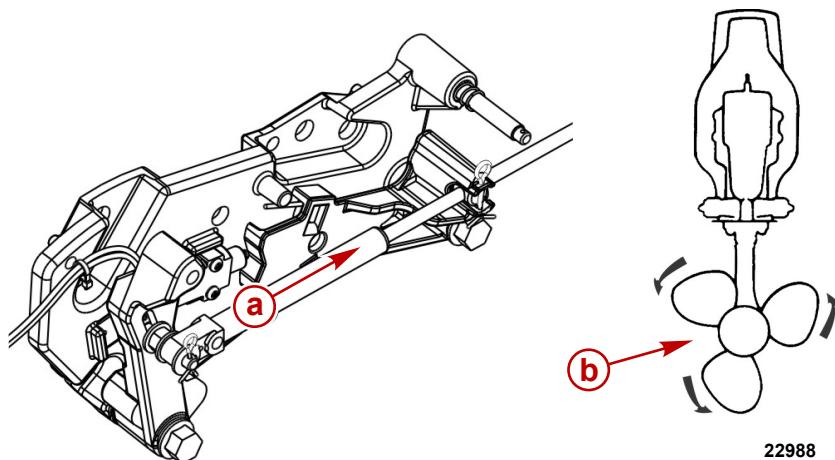
- Left-hand (LH) rotation drive unit** - reverse gear, past detent, into wide-open-throttle position.



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4. Place drive unit into gear by pushing in on drive unit shift cable, while simultaneously rotating propeller shaft counterclockwise until shaft stops, to ensure full clutch engagement. Maintain a light pressure on the drive unit shift cable to hold it at the end of its travel (this removes all slack from the cable).

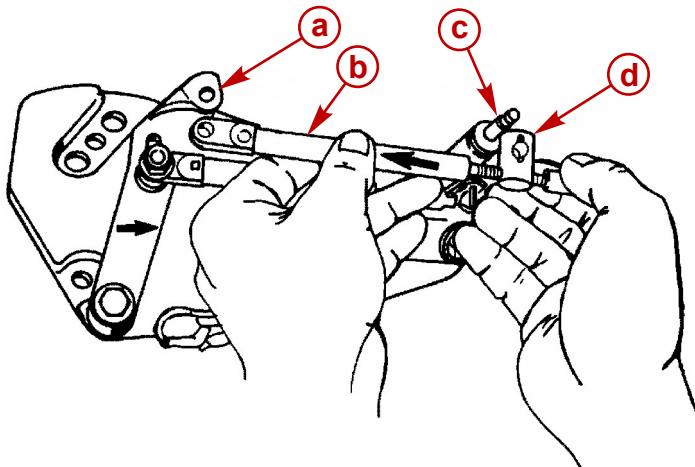
**IMPORTANT: Do not use excessive force when holding pressure on the drive unit shift cable. Excessive force would be indicated by movement of the shift cutout switch.**



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- a - Drive unit shift cable - push in**
- b - Propeller shaft - rotate counterclockwise**

5. Lightly pull on remote control shift cable end guide (to remove slack from remote control and cable) and adjust brass barrel as necessary to align attaching points with shift lever clevis pin hole and stud. Be sure to maintain light pressure on drive unit shift cable.



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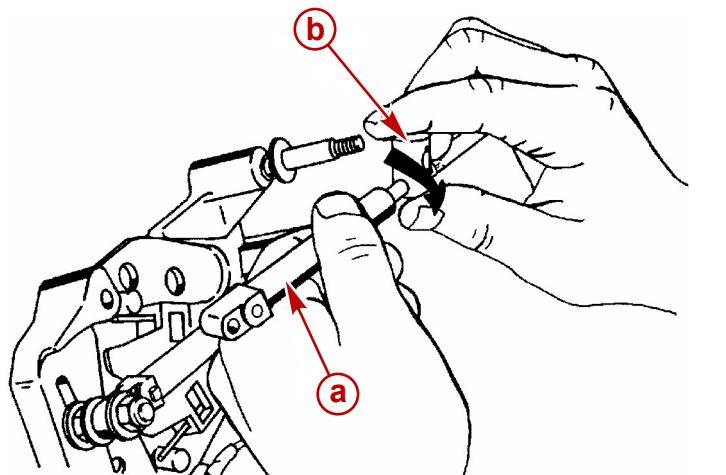
- a - Shift lever clevis pin hole**
- b - Remote control shift cable end guide**
- c - Stud**
- d - Brass barrel**

6. If the shift plate is equipped with a Shift Assist Assembly then skip this step and go to step 7.
  - a. If the shift plate does not have a Shift Assist Assembly then follow these instructions.

**NOTE: Two different size threaded ends have been used on the remote control shift cable.**

## Shift Cable Installation, Drive Unit Installation and Shift Setup

b. After cable has been aligned, turn brass barrel 2 turns away from cable end guide on 1/4 - 28 threaded ends and 4 turns away from cable end guide on 1/4 - 40 threaded ends.

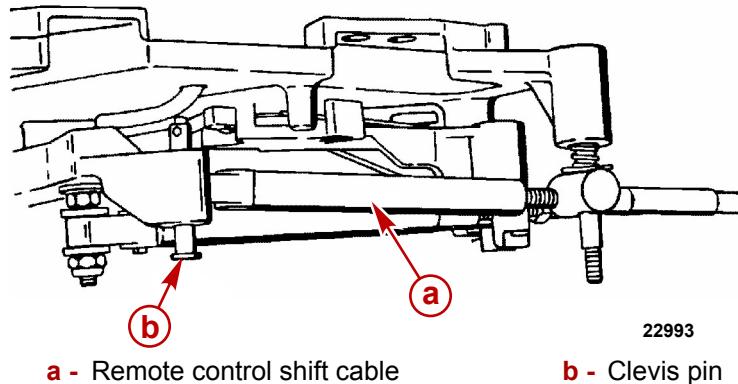


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a - End guide

b - Brass barrel

7. Temporarily install remote control shift cable on stud and install clevis pin.



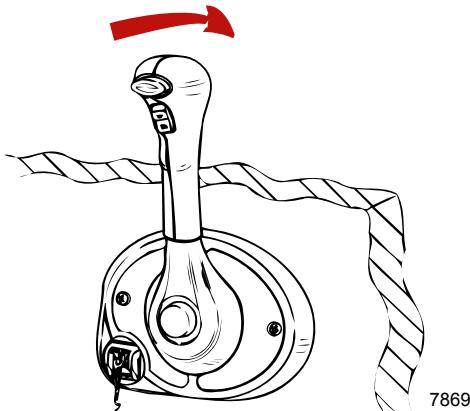
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a - Remote control shift cable

b - Clevis pin

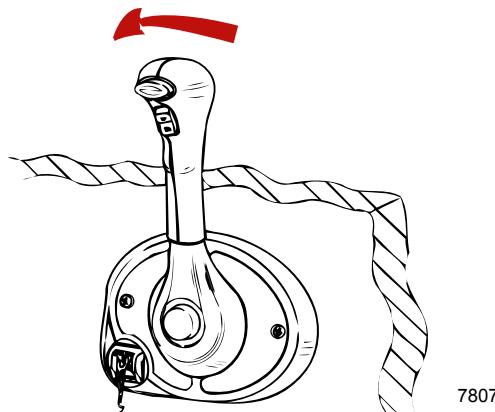
8. Shift remote control as stated in "a" or "b" following (older control shown):

a. **Right-hand (RH) rotation drive unit** - reverse gear, past detent, into wide-open-throttle position.

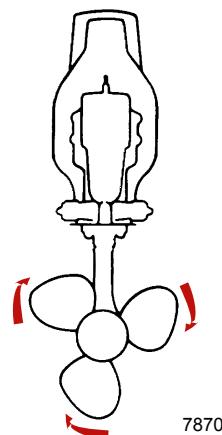


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b. **Left-hand (LH) rotation drive unit** - forward gear, past detent, into wide-open-throttle position.

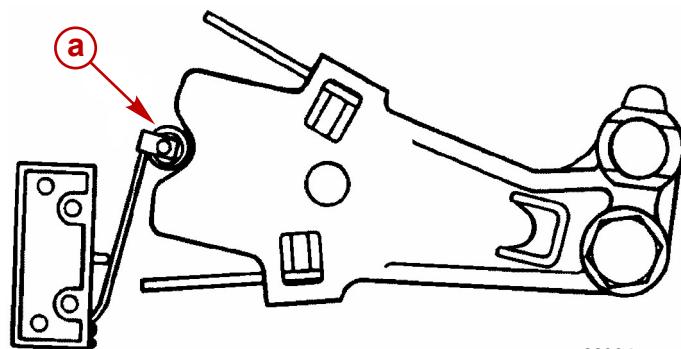


c. Simultaneously rotate propeller shaft clockwise until shaft stops to ensure full clutch engagement.



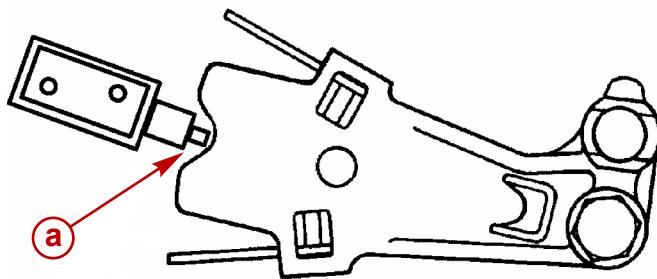
9. Perform "a" or "b" as appropriate:

a. **On models with earlier type switch:** Check shift cutout switch lever position. Roller must be centered.



**a** - Shift cutout switch roller

b. **On models with later type switch:** Check shift cutout switch plunger position. Pin must be centered. Information on checking plunger type cutout switch timing is found at the end of these instructions.



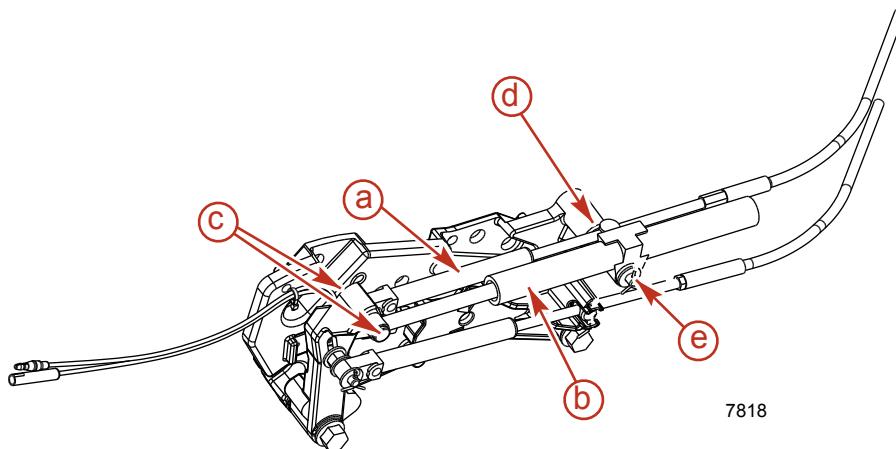
**a** - Shift cutout switch plunger pin

10. If roller or plunger pin is not centered:

- Ensure adjustable stud is at bottom of slot in shift lever.
- Check remote control for proper shift cable output [76 +/- 3 mm (3 +/- 1/8 in.)]. Refer to **Installation Requirements**.
- If a and b are correct, ensure drive unit shift cable is not crushed or kinked. If drive unit shift cable is binding, the shift cutout switch roller or plunger pin will move off center when shifting into and out of forward and reverse).

**NOTE:** If shift cable was damaged during installation, install new shift cable assembly in accordance with instructions contained in sterndrive service manual. Then repeat shift cable adjustment procedure.

11. After remote control shift cable has been properly adjusted, reinstall cable and shift assist assembly (if applicable) and secure with hardware as shown.

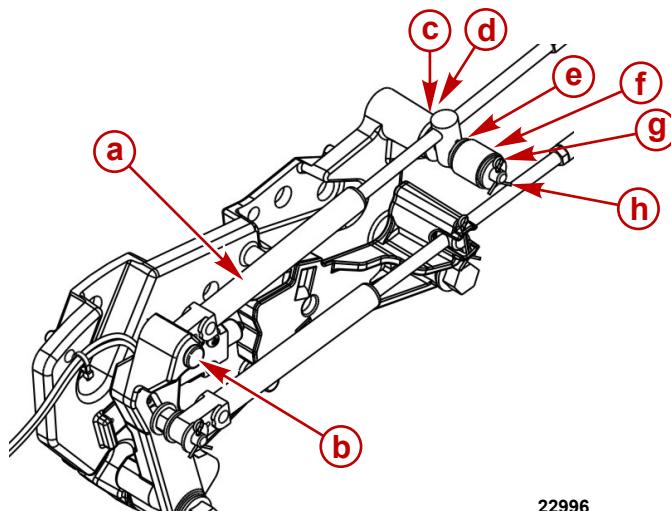


**With Shift Assist Assembly**

- a** - Remote control shift cable
- b** - Shift Assist Assembly
- c** - Clevis pin and cotter pin
- d** - Large I.D. washer
- e** - Small I.D. washer and cotter pin (older models- locknut [tighten until bottomed, then back off 1/2 turn])

a. There should be no pressure on either side of the shift assist assembly attaching point. Failure to adjust properly could apply excessive load to the cable and cause the throttle only portion of the control to hang up and malfunction.

b. If the shift assist assembly requires effort to fit over the anchor stud and clevis pin, the shift cable from the control box is adjusted incorrectly. Remove the shift cable and reposition the adjustment barrel as required to allow the shift assist assembly to be attached with no effort.



**Without Shift Assist Assembly**

- a** - Remote control shift cable
- b** - Clevis pin (with cotter pin-not shown)
- c** - Spring (existing)
- d** - Washer (existing)
- e** - Large I.D. washer
- f** - Spacer
- g** - Small I.D. washer (existing)
- h** - Cotter pin (older models- locknut [tighten until bottomed, then back off 1/2 turn])

**IMPORTANT:** If an extra long remote control shift cable is used, or if there are a large number of bends in remote control shift cable, or remote control has inadequate output travel, an additional adjustment may be necessary. Refer to step 12 or 13 as applicable.

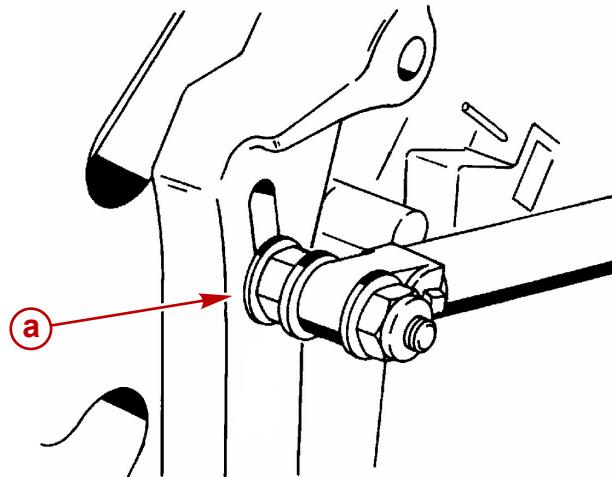
**12. Remote control with single lever shift/throttle control:**

- a. **Right-hand (RH) propeller rotation drive unit** - Shift remote control into reverse gear, wide-open-throttle position while simultaneously rotating propeller shaft clockwise. Clutch should engage and cause propeller shaft to lock. If clutch does not engage, loosen adjustable stud on shift lever and move it upward in slot until clutch engages with reverse gear. Retighten stud. Shift remote control several times and stop in reverse to recheck shift cutout switch position. Roller, or plunger pin, must be centered.
- b. **Left-hand (LH) propeller rotation drive unit** - Shift remote control into forward gear, wide-open-throttle position while simultaneously rotating propeller shaft clockwise. Clutch should engage and cause propeller shaft to lock. If clutch does not engage, loosen adjustable stud on shift lever and move it upward in slot until clutch engages with forward gear. Retighten stud. Shift remote control several times and stop in forward to recheck shift cutout switch position. Roller, or plunger pin, must be centered.

**13. Two lever remote control with separate shift and throttle levers:**

- a. **Right-hand (RH) propeller rotation drive unit** - While turning propeller shaft clockwise, move remote control shift handle into full reverse position. Clutch should engage before shift lever comes to a stop. If clutch does not engage, loosen adjustable stud on shift lever and move it upward in slot until clutch engages with reverse gear. Retighten stud. Shift remote control several times and stop in reverse to recheck shift cutout switch position. Roller, or plunger pin, must be centered.

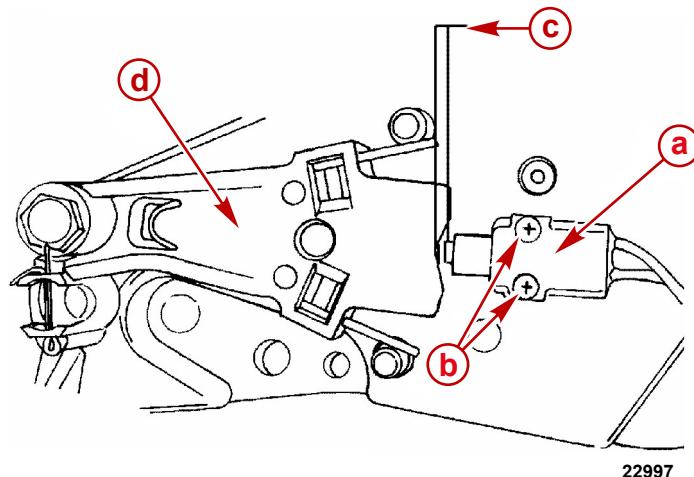
b. **Left-hand (LH) propeller rotation drive unit** - While turning propeller shaft clockwise, move remote control shift handle into full forward position. Clutch should engage before shift lever comes to a stop. If clutch does not engage, loosen adjustable stud on shift lever and move it upward in slot until clutch engages with forward gear. Retighten stud. Shift remote control several times and stop in forward to recheck shift cutout switch position. Roller, or plunger pin, must be centered.



**a** - Adjustable stud

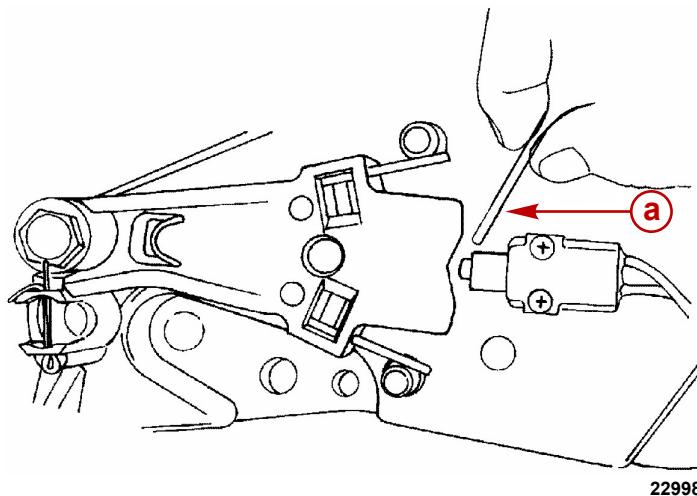
### Checking Alpha Plunger Type Shift Cutout Switch Timing

1. While holding the retainer nuts on the back of the shift plate (for older plates, on newer plates just loosen screws), loosen the two phillips head screws on the shift cutout switch and slowly move the switch either forward or aft.



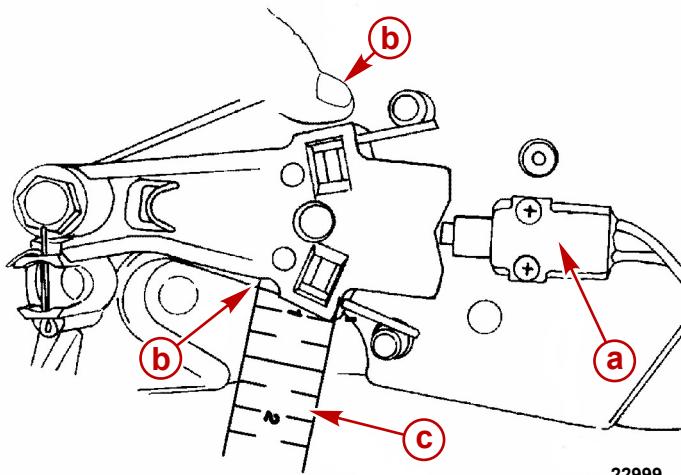
**a** - Switch/plunger pin  
**b** - Two screws  
**c** - 1/32" adjustment gap  
**d** - Activating lever assembly

2. Adjust switch to locate plunger pin to 0.8 mm (1/32 in.) between plunger pin and activating lever assembly.



**a** - 1/32 in. drill bit

3. Slowly move activating lever assembly off until cutout switch opens or closes. Circuit should open or close when the activating lever assembly is moved 4.8 +/- 0.8 mm (3/16 +/- 1/32 in.). Measure with 152 mm (6 in.) steel rule.



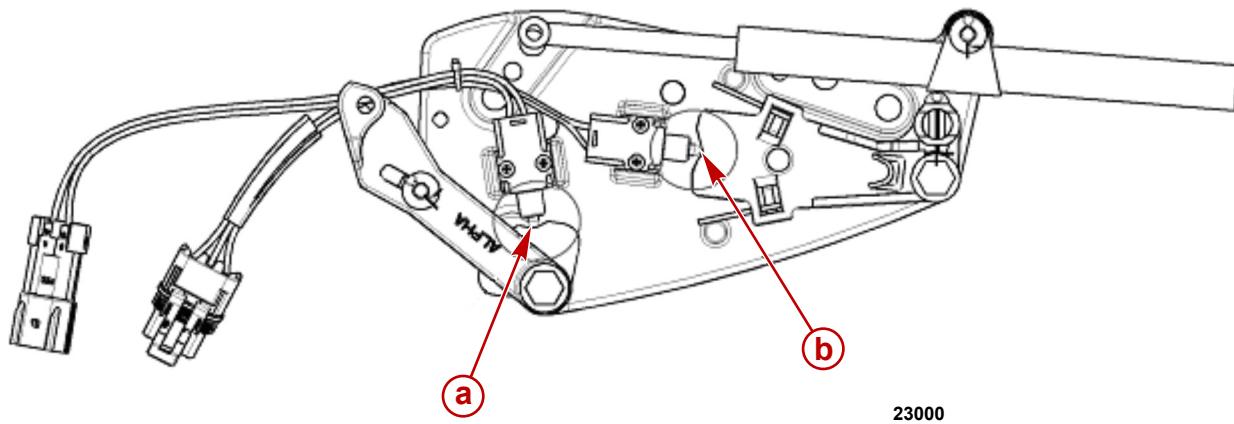
**a** - Cutout switch  
**b** - Movement of activating lever assembly  
**c** - 152 mm (6 in.) steel rule

4. After adjustments are made and are within 4.8 +/- 0.8 mm (3/16 +/- 1/32 in.), tighten the screws on the cutout switch. After tightening screws, recheck the plunger pin position.

## CHECKING SWITCH OPERATION

1. Reconnect throttle cable(s), removed earlier.
2. Place boat in water and start engine. Check the following:
  - Shift into forward and reverse gear, making sure that clutch engages before engine begins to accelerate.
  - Accelerate engine in forward and reverse gear to ensure engine does not shut down.
  - Check that shift cutout switch plunger is centered in notch of shift cutout lever, with drive unit in forward and reverse gear.
  - Shifting from IN gear position to neutral, ensure drive unit is in neutral before remote control shift lever comes to neutral detent position.

## Newer Style Alpha Shift Plate



**a** - In-gear switch (positioned in adjustment notch)  
**b** - Shift interrupt switch

Both switches are now located in slots. There is a machined rib, formed in the shift plate, at each side of the switch. These ribs form a channel that allows the switch to move towards and away from the actuator, without any side play. Switch adjustment is made easier and more accurate.

### In-gear switch

There are two notches on the shift lever. The one used during engine operation is just behind the shift lever (parallel to lever). A second (adjustment) notch is provided as shown above. The shift lever is rotated counter-clockwise to bring the second notch in contact with the In-Gear Switch. This second location allows you to have direct access to the switch mounting screws. You can make a switch adjustment without having to move the shift lever out of the way. This allows for a more accurate adjustment. This switch must be adjusted so that the switch plunger is set at zero clearance (plunger is just making contact with the bottom of the adjustment notch in the shift lever).

### Shift interrupt switch

The shift interrupt switch and the actuating hardware are the same components that were used on the previous shift plate. This switch must be set so that the switch plunger is 0.8 mm (1/32 in.) from the bottom of the notch in the shift actuation arm.

## Newer Shift Levers for Alpha and Bravo



21499

Dual gear indicator switch detents have been added so that lever can be moved from run position to set position for adjusting switch (lever moves out of the way of the adjusting screws and switch plunger can also be viewed). "ALPHA" and "BRAVO" stamped on individual levers for identification.